NASA EOS & SAFARI 2000

EOS/SAFARI 2000 Airborne Campaign Brief: MODLAND Validation Readiness Review

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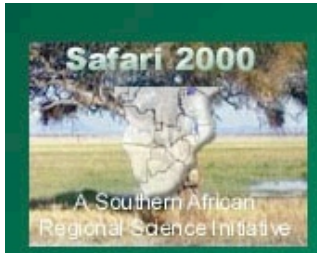
November 1999



SAFARI 2000

3-year Ground-based, Airborne, and Satellite Data Collection: mid 1999-2002

AIRBORNE SCHEDULE

Aug/Sept 1999: 1st Intensive Airborne /Ground Campaign (dry season)
(2 - SAWB Aerocommander 690A)

Feb/March 2000: 2nd Intensive Airborne /Ground Campaign (wet season)
(2 - SAWB Aerocommander 690A)

April 3-7, 2000: SAFARI 2000 Airborne Workshop, Pietersburg, RSA

Aug/Sept 2000: 3rd Intensive Airborne/Ground Campaign (dry season)
(2 - SAWB 690A, NASA ER-2, UW CV-580, & Proteus 281)

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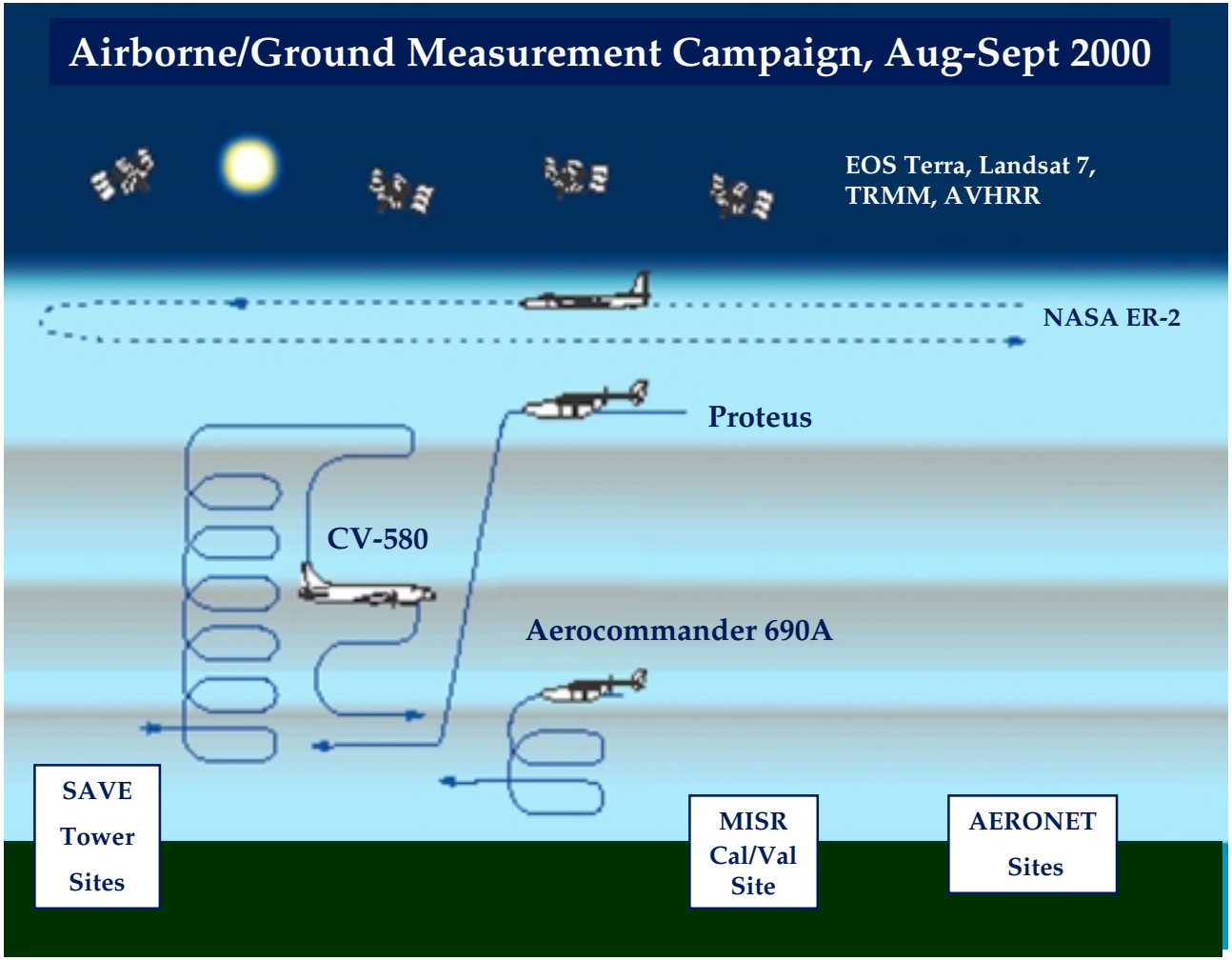

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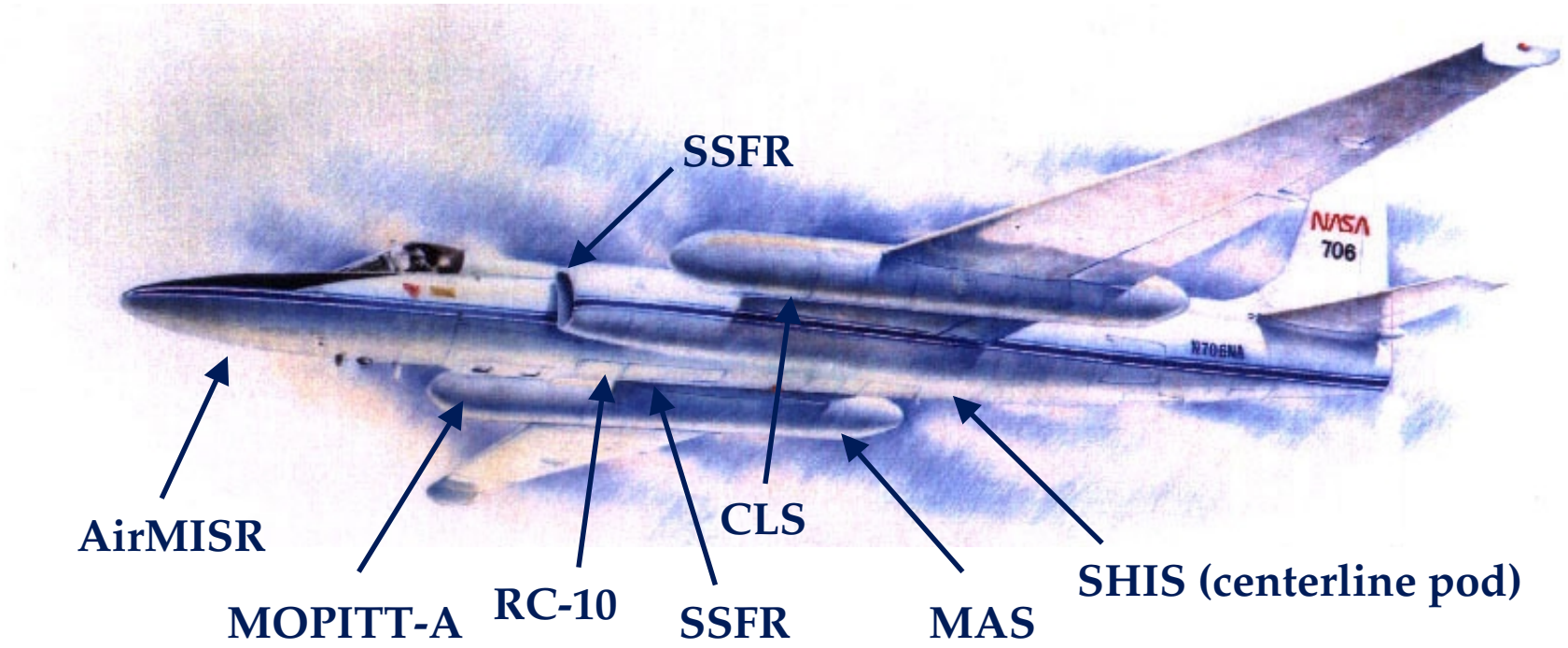
NASA ER-2



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NASA ER-2 Schedule for SAFARI 2000

ER-2 DEPLOYMENT AT PIETERSBURG IN SOUTH AFRICA
PROPOSED SCHEDULE (Year 2000):

8 Aug	**NASA DFRC to Patrick AFB, Fla.**
9 Aug	**Patrick to Recife, Brazil**
11 Aug	**Recife to Pietersburg, RSA**
12 Aug	**Open House Display**
13 Aug-	
24 Sept	**Science flights**
26 Sept	**Pietersburg to Recife**
28 Sept	**Recife to Patrick**
29 Sept	**Patrick to NASA Dryden**

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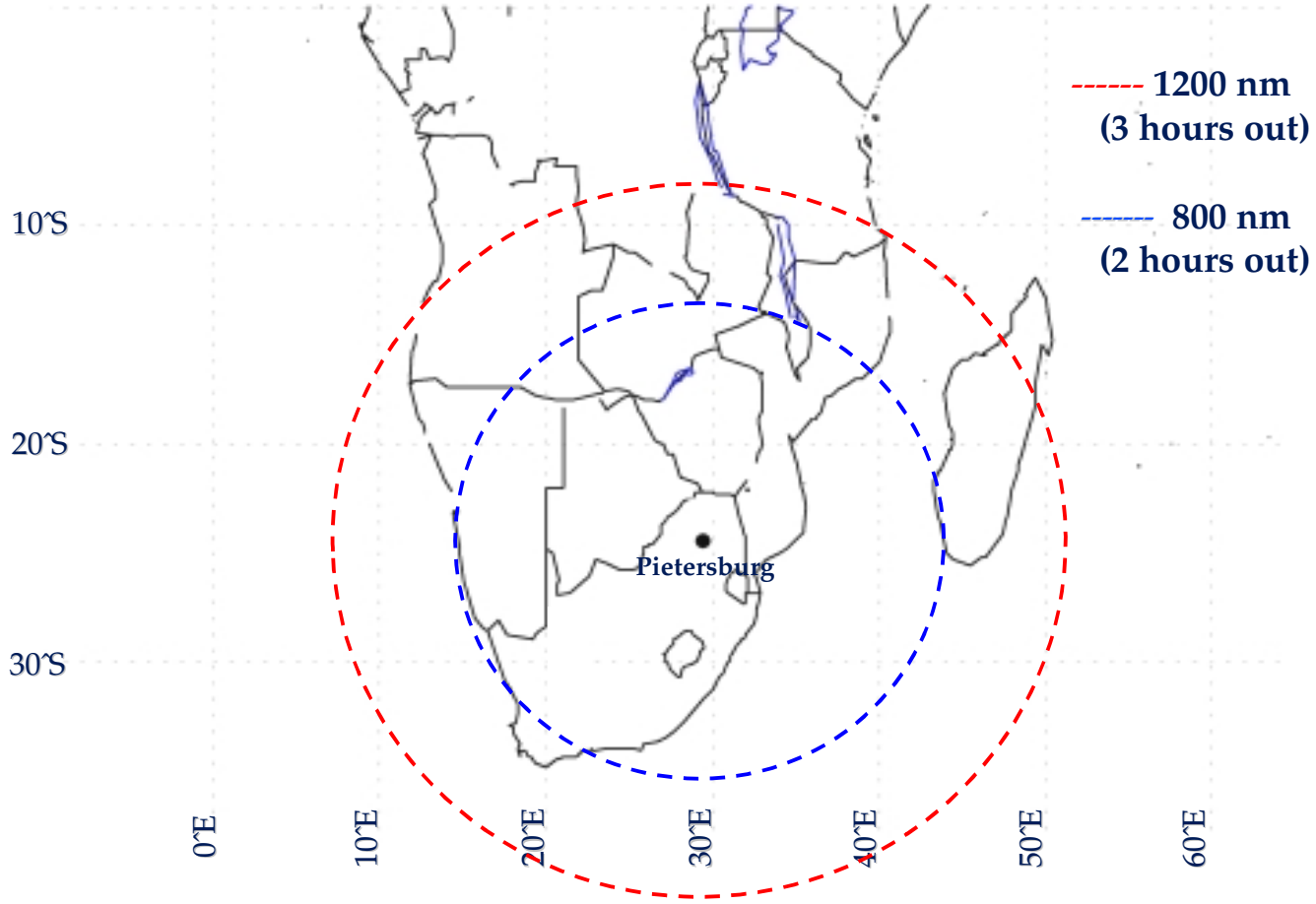
SAFARI 2000
ER-2 Proposed Flight Areas



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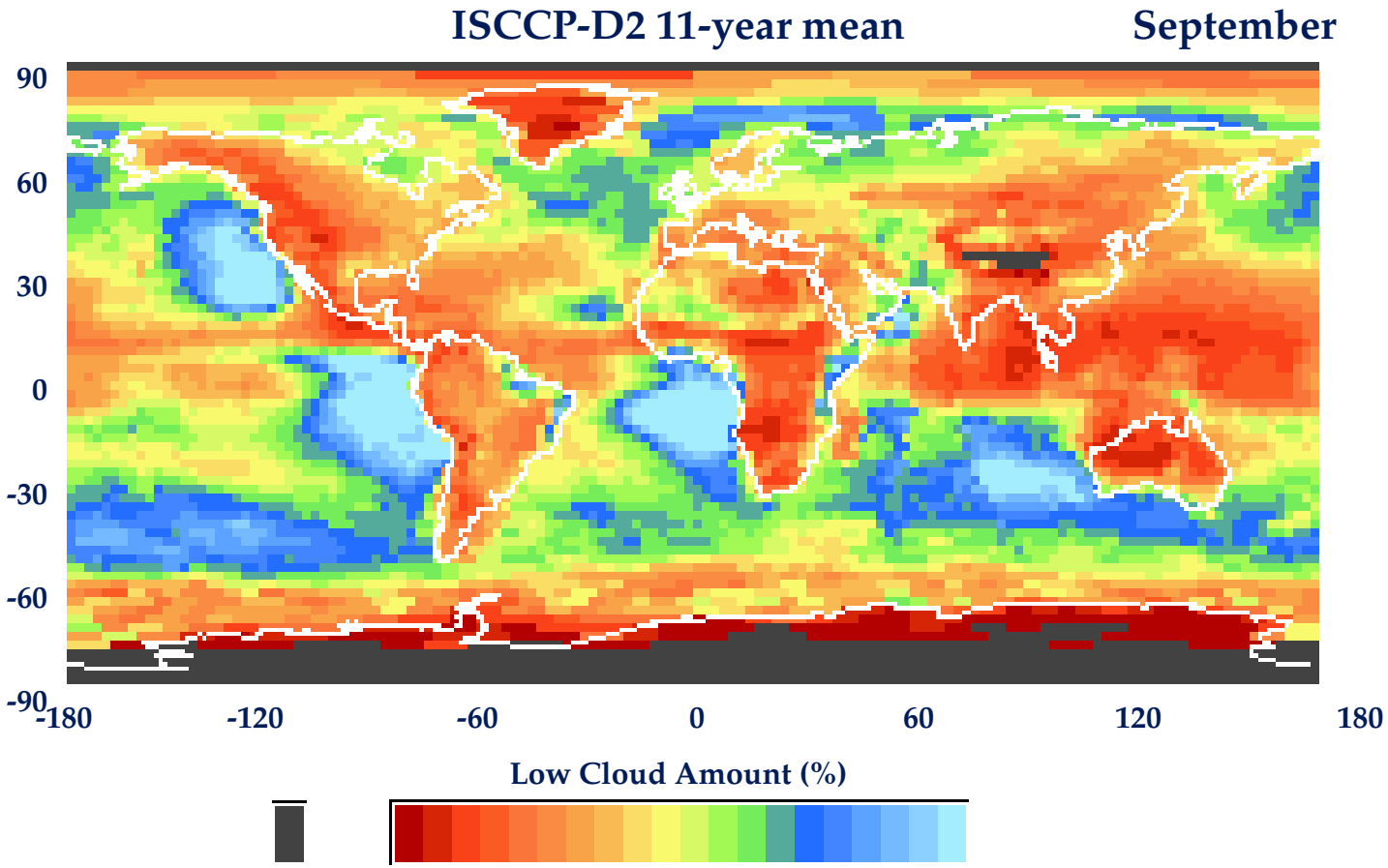
Namibian Stratus Clouds



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U. Washington Convair-580

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Convair CV-580 Schedule for SAFARI 2000

Approximately six weeks and 130 research flight hours

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7 Aug 2000	**Arrive at Pietersburg, South Africa**
8-11 Aug	**Installations & Test Flights**
12 Aug	**Open House Display**
13 Aug-9 Sept	**Research flights based out of Pietersburg**
10-12 Sept	**Transit to Walvis Bay, Namibia; Setup Base**
13-22 Sept	**Research flights based out of Namibia**
23 Sept	**Depart Namibia for return to USA**

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Convair CV-580 Instrumentation

Extensive complement of instruments, including standard aviation instrumentation and many advanced scientific instruments. Instrument groups and approximate number of instrumets are:

A) Navigational & Flight Characteristics - position, speed, attitude, etc.(7)

B) Communications - radio, air-to-ground tele./e-mail, satellite imagery (4)

C) General Meteorological - temp., humidity, winds, turbulence, etc. (12)

D) Aerosol - number, size, scattering coeffficient, shape, type (carbon, sulfate, nitrate), humidification, etc. (7)

E) Cloud size, particle imagery, liquid water content, optical scattering/ extinction (9)

F) Gas/particle Chemistry - SO_2, O_3, CO_2, NO/NO_y, photolysis rate, particulates, hydrocarbons, CO, H_2, alkenes, combustion emissions (10)

G) Remote Sensing - absorption/scattering of clouds, aerosols, & surfaces; solar spectral irradiance; aerosol optical depth; water vapor; lidar; & weather radar (5)

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Proteus Aircraft

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Proteus Aircraft Schedule for SAFARI 2000

Proteus Deployment At Pietersburg In South Africa

Proposed Proteus Deployment Schedule (Year 2000):

11 Aug	**Arrive Pietersburg, RSA**
12 Aug	**Open House Display**
13 Aug-	
22 Sept	**Science flights (40 days)**
24 Sept	**Depart for U.S.**

Key Issues: **Proteus being operated under contract to the NASA Langley Research Center by: Scaled Composites, Inc., Mojave, CA 03501-1663**

Participation in SAFARI 2000 contingent on obtaining additional funding

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Proteus Instruments Proposed for SAFARI 2000

NAST-I : Scanning Michelson Interferometer

- 3.5 - 16 microns (spectral resolution = 0.25 cm^{-1})
- 45 km 13 element swath (2.5 km resolution from 65 Kft)

NAST-M: 16 Channel Microwave Spectrometer

- 50-60 GHz and 113 -119 GHz (2300-6000 microns)
- 65 km continuous swath (2.5 km resolution from 65 Kft)

FIRSC: Far Infrared Michelson Interferometer

- Far Infrared (75 -125 microns & 285 - 1000 microns @ 0.1 cm^{-1})
- Nadir along track viewing (1.0 km resolution from 65 Kft)

MicroMaps: Gas Filter Correlation Radiometer

- 4.6 micron, CO profiling
- Nadir along track viewing (1.0 km resolution from 65 Kft)

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SAWB Aerocommander

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SAWB Aerocommander Flight Characteristics

Nominal operating altitude:	**25 000' - 28 000' AMSL**
Maximum operating altitude:	**31 000' AMSL**
Minimum speed:	**82 KTS**
Nominal cruise speed:	**245 KTS**
Maximum speed:	**260 KTS @ 25000' (as equiped)**
Nominal sampling speed:	**100 - 180 KTS**
Nominal rate of climb:	**1200'/min @ 18000' & 120KTS & 10000lbs**
Maximum rate of climb:	**3400'/min @ 2000'MSL & 140KTS & 9000lbs**
Endurance with maximum fuel:	**5.5 HRS @ 5000'MSL & 150KTS (no reserve)**
Crew Capacity:	**1-4 (with instrument racks)**
Maximum gross weight:	**10 250 lbs**
Cabin payloadat max gross wt:	**1880 lbs @ MAX ZERO FUEL WEIGHT**
Aircraft length:	**44' 4.25"**
Aircraft wingspan:	**46' 6.64"**
Aircraft height:	**14' 11.35"**
Electrical power:	**28 VDC;**
	2kW @ 220VDC, 60Hz
	1kW @ 115VDC, 60Hz
	750W @ 115VDC, 400Hz

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SAWB Aerocommander Instrumentstion

(a) Navigation and Flight Characteristics

Parameter	Technique	Manufacturer & Model	Range*(resolution)
Latitude and longitude	Global pos. sys.	Trimble TNL-2000	global
Position tracks	Telemetry	ESD	120km
Ground speed	Global pos. sys.	Trimble TNL-2000	global
True speed	Pitot & Static press.	Rosemount	10 to 300 KTS
Pitch, role and heading	Synchro to digital	ESD	0 to 359 degrees (0.08 degrees RES)
Angle of Attack	Variable resistance transducer		+/-23 degrees
Altitude	Static pressure	Rosemount	

(b) General Meteorological

Parameter	Technique	Manufacturer & Model	Range*(resolution)
Total air temperature	Platinum wire resistance	Rosemount Model 102AU1AF	-50 to +50 degrees Celsius
Static air temperature	Reverse-flow thermometer In-house	-30 to +50 degrees Celsius	
Humidity	Reverse-flow sensor	In-house	0 to 100%
Static Pressure	Pressure Transducer	Rosemount Model 1201FA1B2B	0 to 32 Hg
Pitot Pressure	Pressure Transducer	Rosemount Model 1201FA1B2B	0 to 5 psi

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SAWB Aerocommander Instrumentstion

(c)Cloud Physics

Parameter	Technique	Manufacturer & Model	Range*(resolution)
Liquid water content	Hot wire resistance	Johnson-Williams	0 to 2 and 0 to 6 g.m**-3
Liquid water content	Hot wire resistance	King / PMS	0 to 5 g.m**-3
Liquid water content	Particle measurement	FSSP-100 / PMS	-
Size spectrum of cloud particles	Forward light scattering	FSSP-100 / PMS	2 to 47 microns (15 channels)*
Images of cloud particles	Diode occultation imaging	OAP-2D-C / PMS	Resolution 25 micron*
Images of precipitation particles	Diode imaging	OAP-2D-P / PMS	Resolution 200 micron*

(d)Interface cards

Card type	Function and Resolution	Quantity	Manufacturer
Timer and Keypad	Sample rate and hot keys	1 card	ESD
Analog to Digital	16 channels, 16 bit, Bipolar (+-10V)	2 cards	ESD
Synchro to Digital	3 channels, 16 bit	2 cards	ESD
PMS 1D	15 channels & activity & Total Strobes	2 cards	ESD
PMS 2D	Image Acquisition	2 cards	ESD
Serial 232/422 Port	GPS interface	1	ESD

* all particle sizes refer to maximum particle dimension

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